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| 10/026,146 | 12/21/2001 | Richard P. Volant | FIS920010219US1 | 8227 |

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| EXAMINER | |
|---|---|
| VU, HUNG K | |

| ART UNIT | PAPER NUMBER |
|---|---|
| 2811 | |

DATE MAILED: 08/24/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 10/026,146 | VOLANT ET AL. | |
| | Examiner | Art Unit | |
| | Hung Vu | 2811 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *06 June 2005*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *1-6 and 8-15* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-6 and 8-15* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

## DETAILED ACTION

### *Claim Rejections - 35 USC § 112*

1. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 1-6 and 8-15 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

The specification does not disclose the resistance of the first conductor is approximately equal to the resistance of the second electrical conductor. Note that the specification only discloses the first and second conductors have equivalent sheet resistivities to solve the problem of resistance asymmetry. Sheet resistivities of the first and second conductors are equal does not necessarily mean the resistances of the first and second conductors are equal. In fact, there are other factors can affect the resistance of the conductor, such as the length and the surface area of the conductor.

2. Claims 1-6 and 8-15 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not

described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

The specification does not disclose the resistance of the first conductor is approximately equal to the resistance of the second electrical conductor. Note that the specification only discloses the first and second conductors have equivalent sheet resistivities to solve the problem of resistance asymmetry. Sheet resistivities of the first and second conductors are equal does not necessarily mean the resistances of the first and second conductors are equal. In fact, there are other factors can affect the resistance of the conductor, such as the length and the surface area of the conductor.

### *Claim Rejections - 35 USC § 103*

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1, 4 and 5, insofar as in compliance with 35 USC, first paragraph, are rejected under 35 U.S.C. 103(a) as being unpatentable over Zhao et al. (PN 5,861,647, of record) in view of Lin (PN 6,303,423, of record).

Zhao et al. discloses, as shown in Figures 7 and 8, a passive electrical device comprising:

a first spiral electrical conductor (20);

a second spiral electrical conductor (52) disposed over the first electrical conductor;

a third electrical conductor (48) connecting the first electrical conductor to the second electrical conductor, wherein the first spiral, second spiral and third electrical conductors are disposed on a semiconductor substrate (28,30) and wherein the sheet resistivity of the first spiral electrical conductor is approximately equal to the sheet resistivity of the second spiral electrical conductor. Note that the first and the second spiral electrical conductors comprise the same material, it is inherent that the sheet resistivity of the first spiral electrical conductor is approximately equal to that of the second spiral electrical conductor [see Col. 3, lines 2-6 and 56-57];

wherein the third electrical conductor consists essentially of one substantially uniform chemical composition (tungsten, aluminum or copper) [see Col. 3, lines 40-41].
Zhao et al. discloses the third electrical conductor has a thickness which separates the first electrical conductor from the second electrical conductor by a distance in a range of 2.3 microns [see Col. 3, lines 23-27, note that the third electrical conductor 48 is formed in the dielectric layer 36 which is the combination of layers 38, 40 and 42]. Zhao et al. does not disclose the third electrical conductor has the thickness which separates the first electrical conductor from the second electrical conductor by a distance in a range of approximately three microns to approximately four microns. However, Lin discloses a device having a third electrical conductor (38) that has a thickness which separates a first electrical conductor (16) from a second electrical conductor (40) by a distance in a range of approximately three microns to approximately four microns. Note Figures 1, 2, 4, and Col. 8, line 52 – Col. 9, line 29, note that the third electrical conductor 38 is formed in the dielectric layers 18 and 20 having the thickness as claimed]. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention

was made to form the third electrical conductor of Zhao et al. having a thickness, as taught by Lin in order to have a desired inductance according to electrical design requirements.

Regarding claim 4, Zhao et al. and Lin disclose the first, second and third electrical conductors consist essentially of copper [see Col. 3, lines 2-6, 39-43 and 56-57].

Regarding claim 5, Zhao et al. and Lin disclose the first and third electrical conductors consist essentially of copper, and the second electrical conductor consists essentially of aluminum [see Col. 3, lines 2-6, 39-43 and 56-57].

4. Claims 1-4 and 6, insofar as in compliance with 35 USC, first paragraph, are rejected under 35 U.S.C. 103(a) as being unpatentable over Wen et al. (PN 6,083,802, of record) in view of Lin (PN 6,303,423, of record).

Wen et al. discloses, as shown in Figures 12 and 13, a passive electrical device comprising:

a first electrical conductor (20);

a second electrical conductor (28) disposed over the first electrical conductor;

a third electrical conductor (26) connecting the first electrical conductor to the second electrical conductor, wherein the first, second and third electrical conductors are disposed on a semiconductor substrate (14) and wherein the sheet resistivity and the resistance of the first electrical conductor is approximately equal to the sheet resistivity and the resistance of the second electrical conductor. Note that the first and the second electrical conductors comprise the same material (copper), it is inherent that the sheet resistivity of the first electrical conductor is

approximately equal to that of the second electrical conductor [see Col. 3, lines 5-14 and 53-65]. Also note that Wen et al. discloses the second conductor (28) is formed by repeating the same process for forming the first conductor (20), it is inherent that the resistance of the first conductor is approximately equal to that of the second conductor [see Col. 3, lines 12 – 14 and lines 57 – 64],

wherein the third electrical conductor consists essentially of one substantially uniform chemical composition (tungsten, aluminum or copper) [see Col. 3, lines 55-57].
Wen et al. discloses the third electrical conductor has a thickness which separates the first electrical conductor from the second electrical conductor by a distance in a range of approximately 5 to 10 microns [see Col. 3, lines 39-41, note that the third electrical conductor 26 is formed in the dielectric layer 24]. Wen et al. does not disclose the third electrical conductor has the thickness which separates the first electrical conductor from the second electrical conductor by a distance in a range of approximately three microns to approximately four microns. However, Lin discloses a device having a third electrical conductor (38) that has a thickness which separates a first electrical conductor (16) from a second electrical conductor (40) by a distance in a range of approximately three microns to approximately four microns. Note Figures 1, 2, 4, and Col. 8, line 52 – Col. 9, line 29, note that the third electrical conductor 38 is formed in the dielectric layers 18 and 20 having the thickness as claimed]. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to form the third electrical conductor of Wen et al. having a thickness, as taught by Lin in order to have a desired inductance according to electrical design requirements.

Regarding claim 2, Wen et al. and Lin disclose each of the first, second and third electrical conductors has a respective thickness, and the thickness of the first electrical conductor is approximately equal to the thickness of the second electrical conductor [see Col. 3, lines 5-14 and 53-65].

Regarding claim 3, Wen et al. and Lin disclose each of the first, second and third electrical conductors has a respective thickness, and the thickness of the first conductor is approximately equal to the thickness of the second electrical conductor and being approximately one-half the thickness of the third electrical conductor.

Regarding claim 4, Wen et al. and Lin disclose the first, second and third electrical conductors consist essentially of copper [see Col. 3, lines 5-14 and 53-65].

Regarding claim 6, Wen et al. and Lin disclose each of the first and second electrical conductors has a respective thickness in a range of approximately five to 20 microns (within the range of approximately two to approximately 32 microns) [see Col. 3, lines 5-14 and 53-65].

5. Claims 5 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wen et al. (PN 6,083,802, of record) in view of Lin (PN 6,303,423, of record) and further in view of Zhao et al. (PN 5,861,647, of record).

Regarding claim 5, Wen et al. and Lin taught the invention substantially as claimed, including the passive electrical device as cited in the rejection of claim above. Wen et al. and Lin also

taught the first, second and third electrical conductors consist essentially of copper. Wen et al. and Lin did not specifically teach the second electrical conductor consists essentially of aluminum. However, Zhao et al. taught a second electrically conductor (52) consists essentially of aluminum or copper [see Figures 8-9, Col. 3, lines 56-57]. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to form the second electrical conductor of Wen et al. and Lin consists essentially of aluminum, such as taught by Zhao et al. because aluminum and copper are commonly used to form the conductor for they have lower resistance, and they are interchangeable.

Regarding claim 8, Wen et al., Lin and Zhao et al. disclose the second electrical conductor has a substantially uniform thickness in a range of approximately five to 20 microns (within the range of approximately four to approximately six microns) [see Col. 3, lines 5-14 and 53-65].

6. Claims 9-11 and 13-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wen et al. (PN 6,083,802, of record) in view of Lin (PN 6,303,423, of record) and further in view of Johnson et al. (PN 6,534,374, of record).

Wen et al., as shown in Figure 3 and 13, the inductor device comprising:

a semiconductor substrate (14);

first, second and third electrical conductors (24,26,28) provided on the substrate, wherein the first and second electrical conductors each has a resistance which is approximately equal. Note that Wen et al. discloses the second conductor (28) is formed by repeating the same process

for forming the first conductor (20), it is inherent that the resistance of the first conductor is approximately equal to that of the second conductor [see Col. 3, lines 12 – 14 and lines 57 – 64]

wherein the third electrical conductor consists essentially of one substantially uniform chemical composition (tungsten, aluminum or copper) [see Col. 3, lines 55-57].

Wen et al. discloses the third electrical conductor has a thickness in a range of approximately 5 to 10 microns [see Col. 3, lines 39-41, note that the third electrical conductor 26 is formed in the dielectric layer 24]. Wen et al. does not disclose the third electrical conductor has the thickness which separates the first electrical conductor from the second electrical conductor by a distance in a range of approximately three microns to approximately four microns and the semiconductor substrate comprises silicon. However, Lin discloses a device having a third electrical conductor (38) that has a thickness which separates a first electrical conductor (16) from a second electrical conductor (40) by a distance in a range of approximately three microns to approximately four microns and a semiconductor substrate (10) comprises silicon. Note Figures 1, 2, 4, and Col. 7, lines 28 – 29 and Col. 8, line 52 – Col. 9, line 29, note that the third electrical conductor 38 is formed in the dielectric layers 18 and 20 having the thickness as claimed. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to form the third electrical conductor of Wen et al. having a thickness, as taught by Lin in order to have a desired inductance according to electrical design requirements, and to form the semiconductor substrate of Wen et al. comprising silicon because silicon is one of the materials that is commonly used to form the substrate.

Wen et al. and Lin do not disclose the first and second conductor are spiral conductors. However, Johnson et al. discloses the first and second conductor are spiral conductors. Note

Figure 2 of Johnson et al.. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to form the first and second conductor of Wen et al. and Lin as the spiral conductors, such as taught by Johnson et al. in order to have a desired inductance over a small surface area.

Regarding claim 10, Wen et al. and Lin taught the invention substantially as claimed, including the passive electrical device as cited in the rejection above. Wen et al. and Lin also taught the semiconductor substrate comprises silicon. Wen et al. and Lin did not teach the semiconductor substrate comprises silicon and germanium. However, Johnson et al. taught a semiconductor substrate (20) comprises silicon and germanium [see Figures 10 and 16 and Col. 5, lines 2-6]. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to form the semiconductor substrate of Wen et al. and Lin comprising silicon and germanium such as taught by Johnson et al. since silicon and germanium are the materials that are commonly used to form the substrate.

Regarding claim 11, Wen et al., Lin and Johnson et al. taught the substrate comprises silicon on insulator substrate [see Col. 5, lines 2-6].

Regarding claim 13, Wen et al., Lin and Johnson et al. taught the second electrical conductor is disposed over the first electric conductor [see Figures 8 and 13].

Regarding claim 14, Wen et al., Lin and Johnson et al. taught the first and second electrical conductors are spiral shaped [see Figure 2].

Regarding claim 15, Wen et al., Lin and Johnson et al. taught each of the first and the second electrical conductors has a sheet resistivity, the sheet resistivity of the first electrical conductor being approximately equal to the sheet resistivity of the second electrical conductor. Note that the first and the second conductors comprise the same material (copper), it is inherent that the sheet resistivity of the first conductor is approximately equal to that of the second conductor [see Col. 3, lines 5-14 and 53-65].

7. Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Wen et al. (PN 6,083,802, of record) in view of Lin (PN 6,303,423, of record) and Johnson et al. (PN 6,534,374, of record) and further in view of Ito (PN 4,758,896, of record).

Wen et al., Lin and Johnson et al. taught the invention substantially as claimed, including the passive electrical device as cited in the rejection above. Wen et al., Lin and Johnson et al. also taught the semiconductor substrate comprises silicon. Wen et al., Lin and Johnson et al. did not teach the semiconductor substrate comprises silicon-on-sapphire. However, Ito taught a semiconductor substrate (10) comprises silicon-on-sapphire [see Figures 1 and 3 and Col. 8, lines 9-36]. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to form the semiconductor substrate of Wen et al., Lin and Johnson et al. comprising silicon-on-sapphire such as taught by Ito since silicon-on-sapphire are the materials that are commonly used to form the substrate.

*Response to Arguments*

8. Applicant's arguments filed 06/06/05 have been fully considered but they are not persuasive.

It is argued, at page 5 of the Remarks, that the statement on page 2, line 7 and page 5, line 7, together with Figures 3B and 4 provides support, written description and enablement for the claimed invention, since the statement "solves the problem of resistance asymmetry" conveys to one skilled in the art that the first and second spiral conductors have equal (or approximately equal) resistances. This argument is not convincing because the statement, as defined on page 5, lines 5-7, states that "the fact that the upper and lower spirals have equivalent sheet resistivities solves the problem of resistance asymmetry". There is nothing mention about the first conductor having a "resistance" approximately equal to a "resistance" of a second conductor.

It is argued, at page 5 of the Remarks, that none of the references discloses a first conductor having a "resistance" approximately equal to a "resistance" of a second conductor. This argument is not convincing because Wen et al. discloses the second conductor (28) is formed by repeating the same process for forming the first conductor (20), it is inherent that the resistance of the first conductor is approximately equal to that of the second conductor [see Col. 3, lines 12 – 14 and lines 57 – 64].

*Conclusion*

9. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hung K. Vu whose telephone number is (571) 272-1666. The examiner can normally be reached on Tuesday-Friday 6:00-4:30, Eastern Time.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's acting supervisor, Steven Loke can be reached on (571) 272-1657. The Central Fax Number for the organization where this application or proceeding is assigned is (571) 273-8300.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

Vu

August 12, 2005

Hung Vu

Primary Examiner